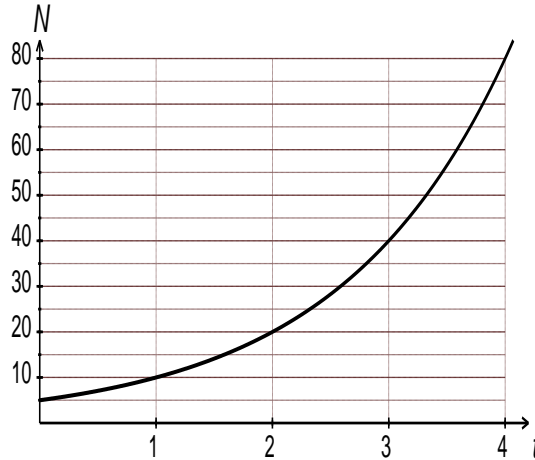


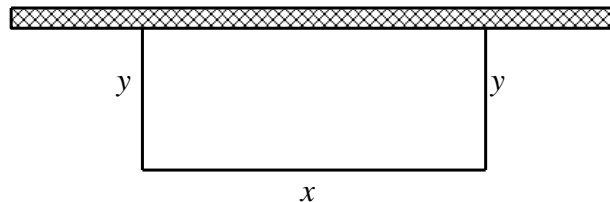
National 5

Homework AP15

1. The graph below shows the function $N(t) = a \times b^t$, where a and b are constants.
Find the values of a and b .



2. The value of an antique has grown by 15% per annum for the last two years.
If the present value is £10580, find the value two years ago.
3. A cylinder has radius $2x$ units and height h units.
A cone has radius x units and height $4x$ units.
Given that they have equal volumes, express h in terms of x .
Use exact values; no decimals.
[Volume of cone $V = \frac{1}{3}\pi r^2 h$.]
4. Express $\frac{x^2 - 9}{3x^2 - 7x - 6}$ in its simplest form.
5. (a) Sketch the graph of $f(x) = 35 + 2x - x^2$.
(b) Hence solve the inequality $35 + 2x - x^2 > 0$.
6. The diagram below shows a rectangular fence built against a straight wall.
The fencing consists of two lengths of fencing each of length y metres and one length of x metres, as shown in the diagram.

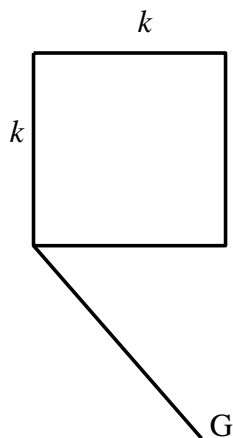


7. (a) Express $x^{\frac{3}{4}} - 2^{-\frac{1}{2}} \cdot x^{\frac{3}{4}} + 2^{-\frac{1}{2}}$ without brackets in its simplest form.
(b) Hence solve $x^{\frac{3}{4}} - 2^{-\frac{1}{2}} \cdot x^{\frac{3}{4}} + 2^{-\frac{1}{2}} = 7\frac{1}{2}$.

8. The total mass of argon in a flask is 4.15×10^{-2} grams.
 The mass of an atom of argon is 6.63×10^{-23} grams.
 How many argon atoms are in the flask? Answer correct to 3 significant figures.

9. (a) Solve $3x^2 - 2x - 4 = 0$, giving the roots correct to one decimal place.
 (b) Solve $\sqrt{5}x = 10$, expressing your answer with a rational denominator.
 (c) $f(x) = 2x^{1/3}$. Find t such that $f(t) = 6$.

10.



A small goat G is tethered at the corner of a shed in a field of green grass.
 The shed is square with sides of length k metres, where $k > 2$.
 The rope used to tether the goat is 2 metres longer than the side of the shed.

- (a) Show that the grazing area available to the goat in square metres is $\frac{3}{4}\pi k^2 + 2\pi$
 (b) Find the length of the rope needed to tie the goat to the corner so that the grazing area is 50π square metres.

11. $\mathbf{u} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ and $\mathbf{v} = \begin{pmatrix} -4 \\ 1 \end{pmatrix}$.

- (a) Find $2\mathbf{u} - 3\mathbf{v}$
 (b) Find $|2\mathbf{u} - 3\mathbf{v}|$

12. Simplify

(a) $\frac{x^2 - x - 1}{x^3 - x - 1}$, $x \neq 0, 1$.

(b) $\frac{a - 4}{a^2 - 4}$, $a \neq \pm 2$